Core Requirements

Core Curriculum

The Core Curriculum at Mines forms the foundation for advanced study in the major fields. It is designed to give students the fundamental knowledge and skills they will need and put to use in their majors and in careers after graduation. Core courses provide students with fundamental technical, mathematical, and writing skills. In Core courses, students learn basic scientific procedures, principles, concepts, laws, and theories relevant to all applied sciences. In addition, Core courses in the humanities and social sciences help students develop interdisciplinary perspectives on the ethical, social, and cultural contexts within which engineering takes place.

The variety of courses in the Core Curriculum also provide students with opportunities to develop skills in problem solving, critical thinking, teamwork, design, and communication. Students who complete the Core are well prepared to be lifelong learners and leaders who can work effectively in an increasingly globalized world.

The Core Curriculum has three parts, the details of which can be found below. All CSM students complete the courses in the Common Core. Courses required in the Science Requirement and Engineering Requirement vary according to the major field of study. Finally, all students have a number of Free Elective courses. Free Electives are usually taken in the last two years.

Refer to the Degree Requirements section for each major program under Undergraduate Programs and Departments for a listing of Core courses students should take each semester.

Overview: Core Course Requirements

Core & distributed course requirements for Bachelor of Science degrees are comprised of the following four groups:

1. Core Curriculum - Students in all degree programs are required to complete all course requirements listed in this group.
2. Humanities & Social Sciences (H&SS) Requirement - Students in all degree programs are required to complete all course requirements listed in this group.
3. Distributed Science Requirement - Students in all degree programs are required to complete a minimum of three courses as prescribed by the specific degree program.
4. Engineering Requirement - Engineering Requirements are applicable to undergraduate students in engineering disciplines as specified by the degree program. See Department and Division program descriptions in this Catalog for specific courses required.

The Core Curriculum

Core requirements are applicable to all undergraduate students:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH111</td>
<td>CALCULUS FOR SCIENTISTS AND ENGINEERS I</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH112</td>
<td>CALCULUS FOR SCIENTISTS AND ENGINEERS II</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH213</td>
<td>CALCULUS FOR SCIENTISTS AND ENGINEERS III</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH225</td>
<td>DIFFERENTIAL EQUATIONS</td>
<td>3.0</td>
</tr>
</tbody>
</table>

CHGN121       PRINCIPLES OF CHEMISTRY I                     4.0
PHGN100       PHYSICS I - MECHANICS                          4.5

In Design

EDNS151       DESIGN I                                       3.0

In Physical Activity (four separate semesters including the following)*

PAGN Elective PHYSICAL ACTIVITY COURSE                     0.5
PAGN Elective PHYSICAL ACTIVITY COURSE                      0.5
PAGN Elective PHYSICAL ACTIVITY COURSE                      0.5
PAGN Elective PHYSICAL ACTIVITY COURSE                      0.5

In Freshman Orientation & Success

CSM101        FRESHMAN SUCCESS SEMINAR                       0.5

Free Electives **

Minimum of 9.0 Semester Hours                               9.0

Total Semester Hrs                                         38.0

* A minimum of 2.0 credit hours. See the Physical Education and Athletics section for specifics.

** A minimum of 9.0 hours of Free Elective are included with each degree-granting program.

1. The choice must not be in conflict with any Graduation Requirements (catalog.mines.edu/undergraduate/undergraduaterequirements/undergraduate/degreerequirements/).
2. Free electives to satisfy degree requirements may not exceed three semester hours (3.0) in activity courses such as band, choir, studio art, physical activity, and varsity athletics courses combined.
3. Transfer credits used for free electives must comply with the transfer credit guidelines.

Humanities & Social Sciences (H&SS) Requirement

All Mines undergraduate students are required to satisfy a Humanities & Social Sciences (H&SS) Core requirement as one component of Mines’ Core Curriculum. The H&SS Core requirement includes 19 credit hours of courses ranging from first-year to senior-level and offered by a variety of academic units across campus. The H&SS Core includes both specified and restricted-elective course requirements as described below.

Core Required Courses*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HASS100</td>
<td>NATURE AND HUMAN VALUES</td>
<td>4.0</td>
</tr>
<tr>
<td>HASS200</td>
<td>GLOBAL STUDIES</td>
<td>3.0</td>
</tr>
<tr>
<td>EBGN201</td>
<td>PRINCIPLES OF ECONOMICS</td>
<td>3.0</td>
</tr>
<tr>
<td>MID-LEVEL</td>
<td>Two courses from the approved list</td>
<td>6.0</td>
</tr>
<tr>
<td>ELECTIVE</td>
<td>of requirements</td>
<td></td>
</tr>
<tr>
<td>400-LEVEL</td>
<td>One course at the 400-level from</td>
<td>3.0</td>
</tr>
<tr>
<td>ELECTIVE</td>
<td>the approved list of requirements</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Hrs                                         19.0

* These course requirements are modified for students in the following programs: Thorson Honors, McBride Honors, and Bachelor of Science in Engineering (BSE). Students in these programs can find program-specific requirements within the relevant program sections of this catalog.
The table below includes the complete list of courses satisfying the Humanities & Social Sciences (H&SS) Core Restricted Electives requirement.

The various course codes and their respective academic division or department can be found in the table below:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBGN</td>
<td>Economics &amp; Business</td>
</tr>
<tr>
<td>EDNS</td>
<td>Engineering, Design, and Society</td>
</tr>
<tr>
<td>HASS</td>
<td>Humanities, Arts, and Social Sciences</td>
</tr>
<tr>
<td>HNRS</td>
<td>Honors</td>
</tr>
<tr>
<td>LIFL</td>
<td>Foreign Language</td>
</tr>
<tr>
<td>PEGN</td>
<td>Petroleum Engineering</td>
</tr>
</tbody>
</table>

With the exception of HASS, LIFL, and HNRS, not all courses with these codes count toward the Humanities & Social Sciences (H&SS) Core Restricted Electives requirement.

The table below includes the complete list of courses satisfying the Humanities & Social Sciences (H&SS) requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HASSXXX</td>
<td>All HASS courses are eligible for Humanities and Social Sciences (H&amp;SS) credit (see your advisor)</td>
</tr>
<tr>
<td>LIFLXXX</td>
<td>All LIFL courses are eligible for Humanities and Social Sciences (H&amp;SS) credit (see your advisor)</td>
</tr>
<tr>
<td>HNRSXXX</td>
<td>All HNRS courses are eligible for Humanities and Social Sciences (H&amp;SS) credit (see your advisor)</td>
</tr>
<tr>
<td>EBGN301</td>
<td>INTERMEDIATE MICROECONOMICS</td>
</tr>
<tr>
<td>EBGN310</td>
<td>ENVIRONMENTAL AND RESOURCE ECONOMICS</td>
</tr>
<tr>
<td>EBGN320</td>
<td>ECONOMICS AND TECHNOLOGY</td>
</tr>
<tr>
<td>EBGN330</td>
<td>ENERGY ECONOMICS</td>
</tr>
<tr>
<td>EBGN340</td>
<td>ENERGY AND ENVIRONMENTAL POLICY</td>
</tr>
<tr>
<td>EBGN401</td>
<td>ADVANCED TOPICS IN ECONOMICS</td>
</tr>
<tr>
<td>EBGN430</td>
<td>ADVANCED ENERGY ECONOMICS</td>
</tr>
<tr>
<td>EBGN434</td>
<td>PROPERTY RIGHTS AND NATURAL RESOURCES</td>
</tr>
<tr>
<td>EBGN437</td>
<td>REGIONAL ECONOMICS</td>
</tr>
<tr>
<td>EBGN441</td>
<td>INTERNATIONAL ECONOMICS</td>
</tr>
<tr>
<td>EBGN443</td>
<td>PUBLIC ECONOMICS</td>
</tr>
<tr>
<td>EBGN470</td>
<td>ENVIRONMENTAL ECONOMICS</td>
</tr>
<tr>
<td>EDNS315</td>
<td>ENGINEERING FOR SOCIAL AND ENVIRONMENTAL RESPONSIBILITY</td>
</tr>
<tr>
<td>EDNS375</td>
<td>ENGINEERING CULTURES</td>
</tr>
<tr>
<td>EDNS430</td>
<td>CORPORATE SOCIAL RESPONSIBILITY</td>
</tr>
<tr>
<td>EDNS475</td>
<td>ENGINEERING CULTURES IN THE DEVELOPING WORLD</td>
</tr>
<tr>
<td>EDNS477</td>
<td>ENGINEERING AND SUSTAINABLE COMMUNITY DEVELOPMENT</td>
</tr>
<tr>
<td>EDNS478</td>
<td>ENGINEERING AND SOCIAL JUSTICE</td>
</tr>
<tr>
<td>EDNS479</td>
<td>COMMUNITY-BASED RESEARCH</td>
</tr>
<tr>
<td>EDNS480</td>
<td>ANTHROPOLOGY OF DEVELOPMENT</td>
</tr>
<tr>
<td>MGN335</td>
<td>COMMUNITIES AND NATURAL RESOURCE DEVELOPMENT</td>
</tr>
<tr>
<td>PEGN430</td>
<td>ENVIRONMENTAL LAW AND SUSTAINABILITY</td>
</tr>
</tbody>
</table>

The Science Requirement is a minimum of three courses and is applicable to all undergraduate students as follows:

** Core Requirements - (2020-2021 Catalog) **

The additional 9 credit hours of mid-level and 400-level electives must meet the following requirements:

- At least 3 credit hours must be at the 400 level.
- At least 3 credit hours must have a HASS (Humanities, Arts, and Social Sciences) course code.
- No more than 6 credit hours can have the LIFL (Foreign Languages) course code.
- Courses with the LIMU (Music) course code cannot be used to satisfy this requirement.
- Single majors in Economics cannot use courses with the EBGN course code.
- Except for foreign languages, no AP or IB credit can be used to meet this requirement.
- HASS498 special topic courses can be used to satisfy this requirement.
- The additional 9 credit hours of mid-level and 400-level electives applicable to all undergraduate students as follows:

** The Science Requirement is a minimum of three courses and is applicable to all undergraduate students as follows:**

** APPLIED MATH & STATISTICS **

- MATH201 PROBABILITY AND STATISTICS FOR ENGINEERS
- PHGN200 PHYSICS II-ELECTROMAGNETISM AND OPTICS
- CSC101 INTRODUCTION TO COMPUTER SCIENCE
- or CBEN110 FUNDAMENTALS OF BIOLOGY I
- or CHGN122 PRINCIPLES OF CHEMISTRY II (SC1)
- or CHGN122 MOLECULAR ENGINEERING & MATERIALS CHEMISTRY

** BIOCHEMISTRY **

- PHGN200 PHYSICS II-ELECTROMAGNETISM AND OPTICS
- CHGN122 PRINCIPLES OF CHEMISTRY II (SC1)
- CBEN110 FUNDAMENTALS OF BIOLOGY I
- or CBEN110 FUNDAMENTALS OF BIOLOGY I
- or GEGN101 EARTH AND ENVIRONMENTAL SYSTEMS

** CHEMICAL ENGINEERING **

- CBEN110 FUNDAMENTALS OF BIOLOGY I
- PHGN200 PHYSICS II-ELECTROMAGNETISM AND OPTICS
- CHGN122 PRINCIPLES OF CHEMISTRY II (SC1)
- CBEN110 FUNDAMENTALS OF BIOLOGY I
- or GEGN101 EARTH AND ENVIRONMENTAL SYSTEMS

** CHEMICAL & BIOCHEMICAL ENGINEERING **

- CBEN110 FUNDAMENTALS OF BIOLOGY I
- PHGN200 PHYSICS II-ELECTROMAGNETISM AND OPTICS
- CHGN122 PRINCIPLES OF CHEMISTRY II (SC1)

** CIVIL ENGINEERING **

- FOUR COURSES REQUIRED
- CHGN122 PRINCIPLES OF CHEMISTRY II (SC1)
MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
or CBEN110  FUNDAMENTALS OF BIOLOGY I

COMPUTER SCIENCE
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CSCI101  INTRODUCTION TO COMPUTER SCIENCE
MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS

ECONOMICS
CSCI101  INTRODUCTION TO COMPUTER SCIENCE
MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS
CBEN110  FUNDAMENTALS OF BIOLOGY I
or GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
or PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
or CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY

ELECTRICAL ENGINEERING
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS

CHOOSE TWO FROM BELOW
CBEN110  FUNDAMENTALS OF BIOLOGY I
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY
CSCI101  INTRODUCTION TO COMPUTER SCIENCE

ENGINEERING
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CSCI101  INTRODUCTION TO COMPUTER SCIENCE
or MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS
MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS
or CBEN110  FUNDAMENTALS OF BIOLOGY I
or CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY
or CSCI101  INTRODUCTION TO COMPUTER SCIENCE
or GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS

ENVIRONMENTAL ENGINEERING
FOUR COURSES REQUIRED
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
MATH201  PROBABILITY AND STATISTICS FOR ENGINEERS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS

GEOLOGICAL ENGINEERING
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY

GEOPHYSICAL ENGINEERING
CSCI101  INTRODUCTION TO COMPUTER SCIENCE
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS

MECHANICAL ENGINEERING
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY
CSCI101  INTRODUCTION TO COMPUTER SCIENCE
& CSCI102  and INTRODUCTION TO COMPUTER SCIENCE - LAB

METALLURGICAL & MATERIALS ENGINEERING
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY
CBEN110  FUNDAMENTALS OF BIOLOGY I
or GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS

MINING ENGINEERING
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)

PETROLEUM ENGINEERING
GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)

ENGINEERING PHYSICS
PHGN200  PHYSICS II-ELECTROMAGNETISM AND OPTICS
CHGN122  PRINCIPLES OF CHEMISTRY II (SC1)
or CHGN125  MOLECULAR ENGINEERING & MATERIALS CHEMISTRY
CBEN110  FUNDAMENTALS OF BIOLOGY I
or GEGN101  EARTH AND ENVIRONMENTAL SYSTEMS
or CSCI101  INTRODUCTION TO COMPUTER SCIENCE

Engineering Requirement (see degree program listing)

Engineering Requirements are applicable to undergraduate students in engineering disciplines as specified by the degree program. See
Department and Division program descriptions in this Catalog for specific courses required.

**THE FRESHMAN YEAR**

Freshmen in all programs normally take similar subjects. A sample first year schedule is listed below:

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Fall</th>
<th>lec</th>
<th>lab</th>
<th>sem.hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHGN121</td>
<td>PRINCIPLES OF CHEMISTRY I</td>
<td></td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>MATH111</td>
<td>CALCULUS FOR SCIENTISTS AND ENGINEERS I</td>
<td></td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>EBGN201</td>
<td>PRINCIPLES OF ECONOMICS’</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>HASS100</td>
<td>NATURE AND HUMAN VALUES</td>
<td></td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>CSM101</td>
<td>FRESHMAN SUCCESS SEMINAR</td>
<td></td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>PAGN</td>
<td>PHYSICAL ACTIVITY ELECTIVE</td>
<td></td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Elective</td>
<td>ELECTIVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>lec</th>
<th>lab</th>
<th>sem.hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH112</td>
<td>PRINCULS FOR SCIENTISTS AND ENGINEERS II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDNS151</td>
<td>DESIGN I”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHGN100</td>
<td>PHYSICS I - MECHANICS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIST SCI</td>
<td>Distributed Science Requirement”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAGN</td>
<td>PHYSICAL ACTIVITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>ELECTIVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Hrs: 32.0

* For scheduling purposes, registration in combinations of GEGN101, CBEN110, HASS100, EBGN201, MATH201, CSCI101, and EDNS151 will vary between the fall and spring semesters. Students admitted with acceptable advanced placement credits will be registered in accordance with their advanced placement status.

** Completion of EDNS155 in lieu of EDNS151 is by permission only and does not alter the total hours required for completion of the degree.